Rational Exponents – Word Problems Worksheet

Instructions

Solve all questions. Show full working. Write answers using positive exponents where possible.

Level 1: Understanding

1. A bacteria culture shrinks by a factor of 2^{-3}. What fraction represents this decrease?
2. A scientist writes a measurement as 10^{-2}. What is this value as a decimal?
3. A square has a side length of x^{-1} meters. Write this length without a negative exponent.

Level 2: Application

4. A computer processes data at a rate of 2^5 units per second, but operates at 2^{-3} times slower. What is the new processing rate?
5. A signal strength is represented by x^6, but interference reduces it by x^{-2}. What is the resulting signal strength?
6. A device stores data in units of 10^4, but compression reduces it by 10^{-6}. What is the final storage size?

Level 3: Higher Order Thinking

7. A lab experiment involves $(2^{-2} \times 2^5) \div 2^{-1}$. Simplify.
8. The brightness of a star is modeled as $(3^{-2})^3$. Rewrite using positive exponents and simplify.
9. A digital system processes data according to $x^{-4} \div x^{-1}$. Explain and simplify.

Challenge

10. In nanotechnology, a length is measured as 5×10^{-9} meters.
    (a) Write as a decimal.
    (b) Explain what the negative exponent means.

LIVEWORKSHEETS